

Saturn's Atmospheric Composition from Observations by the Cassini/Composite Infrared Spectrometer

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ABSTRACT

Thermal emission infrared observation of Saturn's atmosphere are being made by the Composite Infrared Spectrometer (CIRS) aboard the Cassini spacecraft since its insertion in Saturn's orbit on July 2nd, 2004. The measurements made in both limb and nadir modes of observations consist of infrared spectra in the 10-1400 cm^{-1} region with a variable spectral resolution of 0.53 cm^{-1} and 2.8 cm^{-1} , and exhibit rotational and vibrational spectral features that may be analyzed for retrieval of the thermal structure and constituent distribution of Saturn's atmosphere. In this paper, we present a comprehensive analysis of the CIRS infrared observed spectra for retrieval of Saturn's atmospheric composition focusing on the distributions of some selected hydrocarbons, phosphine, ammonia, and possible determination of the isotopic ratios of some species with sufficiently strong isolated spectral features. A comparison of the retrieved constituent distributions with the available data in the literature will be made.